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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,833	06/25/2001	Steven Verhaverbeke	004730	2675

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APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER

TUROC, DAVID P

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/891,833

Applicant(s)

VERHAVERBEKE ET AL.

Examiner

David Turocy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION:

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 8-13, and 18-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-13, 18 and 39-42 is/are allowed.
- 6) ☒ Claim(s) 19-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/31/2005 has been entered.

Response to Amendment

2. Applicants amendments and arguments, filed 1/31/2005, have been reviewed and fully considered by the examiner. The examiner acknowledges the cancellation of claims 1-7 and the addition of new claims 18-42. Claims 8-13 and 18-42 are pending.

Response to Arguments

3. Applicant's arguments filed 1/31/2005 have been fully considered but they are not persuasive.

The applicants has argued against the McConnell reference stating that it fails to teach that the volume of the tube equals the measured amount used in a single wafer process. Such a limitation is not required by the claim as written, the claim only requires that the measured amount of fluid is applied during the process, and is not limited to only the amount measured within the "known volume" of the tube. Therefore,

as discussed in the previous office action, McConnell discloses applying the known volume of chemical during the semiconductor wafer cleaning process.

The applicant has argued against the Ryu reference stating that it fails to teach a tube that is completely filled or the volume equal to the measured amount of chemical. The examiner respectfully disagrees. As shown in figure 2, tube 1a is completely filled with the chemical solution, which has a known volume and therefore filling of tube 1a results in a measured amount of chemical. In addition, as written, the claim does not require only that the measured amount of fluid applied during the process, but only requires that this amount *is* applied.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 22, 25, and 28 are rejected under 35 U.S.C. 112, second paragraph; as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claims 22, 25, and 28 recites the limitation "wherein the means to change the amount of chemical" in line 1. There is insufficient antecedent basis for this limitation in the claim. For the purposes of applying art the claims are interpreted to read "...further comprising the step of changing the amount of chemical used by changing the volume of said tube."

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 19, 21, 23-24, 26-27, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by McConnell et al. (US 4,899,767).

Claims 19, 21, and 23-24: McConnell et al. also teaches a delivery system for special fluids such as HF comprising two consecutive 3-port valves to accurately control the amount of HF that is injected into a water flow stream in order deliver precise concentrations of HF to the semiconductor cleaning process (Figure 5 and col. 12, lines 9-62). This valve system of Figure 5 necessarily has a known volume, and the described process comprises the steps of filling the tube with a cleaning chemical to generate a measured amount of said chemical and applying the measured amount to a semiconductor wafer in a single semiconductor wafer cleaning process. McConnell et al. also discloses changing a valve system from a charging mode to a discharge mode, and visa versa, by performing a single change of state (Figure 5 and col. 12, lines 9-62).

Claims 26-27 and 31: McConnell et al. additionally teaches the steps of flowing DI water into said valve system and pushing the measured amount of chemical into a chamber with said DI water, and continuing to flow said DI water (and chemical) into said chamber until a predetermined level is reached in said chamber.

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McConnell et al. teaches that its process may be used with *one* or more semiconductor wafers in col. 13, lines 56-57, therefore McConnell et al. discloses a single semiconductor wafer cleaning process.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ryu (US 5,346,302).

Ryu discloses a method of generating a measured amount of a chemical in a semiconductor wafer cleaning process (see Background in col. 1) comprising: flowing a chemical into a valve system having a tube of a known volume (dispensing container 1a); filling said tube with said known volume with said chemical wherein filling the tube generates a measured amount of chemical approximately equal to the known volume of the tube (col. 3, lines 5-33); and applying said measured amount of said chemical to a semiconductor wafer cleaning process (also see col. 5). Ryu merely lacks a teaching that the measured amount of chemical (HF) is applied to a *single* semiconductor wafer. It would have been obvious to one having ordinary skill in the art to have applied the mixed HF solution of Ryu to a single semiconductor wafer with the expectation of successful results since Ryu is silent as to whether a single wafer or a plurality of wafers

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are treated simultaneously, and because it is well known in the semiconductor wafer cleaning art to clean wafers one at a time.

10. Claims 19-20, 23-24, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3045702 by Nakata in view of McConnell et al.

Nakata discloses a method of accurately reproducing volume of fluid from one fluid stream to another (Column 1, lines 9-11). Nakata discloses flowing a chemical into a 6 port-valve system with a tube (25) of known volume, filling the tube to generate a measured amount of chemical approximately equal to the known volume of the tube (Figure 3, Column 5, lines 44-46). Nakata discloses changing the valve system from charging to discharging, and visa versa, by performing a single change of state of the multi-port valve (Column 2, lines 27-53). While the examiner notes Nakata uses gas chemicals to illustrate the valve system, Nakata discloses the valve relates to a fluid sampling apparatus, and therefore one of ordinary skill in the art at the time of the invention would reasonably expect the valve system as disclosed by Nakata to effectively reproduce accurate volumes of one fluid within another fluid.

Nakata fails to disclose applying the measured amount of chemical to a semiconductor wafer in a single semiconductor wafer etching or cleaning process.

However, McConnell et al. discloses accurately control the amount of HF that is injected into a water flow stream in order deliver precise concentrations of HF to the semiconductor cleaning process (col. 12, lines 9-62). McConnell et al. additionally

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teaches the steps of flowing DI water into pushing the measured amount of chemical into a chamber continuing to flow said DI water (and chemical) into said chamber until a predetermined level is reached in said chamber.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nakata to accurately measure a precise amount of HF in a water stream during a semiconductor cleaning process as suggested by McConnell et al. to provide a desirable precise volume of fluid into another fluid, i.e. concentration because Nakata discloses accurately delivering a known volume of one fluid into another fluid is known in the art to provide accurate, reproducible volume of fluid within a delivery stream with and therefore would reasonably be expected to effectively provide accurate concentrations during a semiconductor cleaning process.

11. Claims 20 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over McConnell et al.

Claims 20, 30: McConnell et al. lacks a teaching of the use of a 6-port valve in its valve system. McConnell et al. states in col. 6, lines 59-65 that "various multiport two- or three-position valves may be substituted in the loop for certain groups of two or more valves shown in the figures." McConnell et al. also states with regard to Figure 5, "a five port, four way valve may also be used in place of the two three port, 2 position valves" (col. 12, lines 44-46). Therefore, McConnell et al. suggests the replacement of numerous smaller valves with multi-port valves. It would have been obvious to have replaced two 3-port valves of McConnell et al. with a 6-port valve with the expectation of

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equivalent results since it is known that a 6-port valve may perform the same as two 3-port valve in succession.

Claim 29: McConnell et al lacks a teaching of applying the mixed chemical solution to a spinning wafer. McConnell et al. teaches a desire to provide uniform exposure of the wafer(s) treated to the cleaning solution in the process of its invention. It is well known in the semiconductor manufacturing art that spinning of wafers immersed in a treatment solution ensures that all areas of the semiconductor wafer are exposed equally to the treatment solution. It would have been obvious for one having ordinary skill in the art to have spun the semiconductor wafer(s) while immersed in the various cleaning solutions in McConnell et al.'s process in order to equally expose all areas of the wafer(s).

12. Claims 22, 25, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3045702 by Nakata in view of McConnell et al as applied to claims 19, 23, and 26 above, and further in view of US Patent 4243071 by Shackelford.

Nakata in view of McConnell teaches all the limitations of these claims as discussed above in the 35 USC 103(a) rejection, however, they fail to disclose changing the amount of chemical used by changing the volume of said tube.

However, Shackelford, teaching of a method for retaining precise amount of liquid using a valve, discloses interchanging the tube to change the volume of the reservoir (Abstract, Column 5, lines 9-13).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nakata in view of McConnell to interchange the tube to change the volume of chemical retained within the tube as suggested by Shackelford to provide a desirable precise amount of chemical in semiconductor cleaning process because Shackelford discloses changing the tube to change the volume of a chemical is known in the art to retain different volumes of fluid using the same valve and therefore would reasonably be expected to effectively provide different concentrations using the same valve in a semiconductor cleaning process.

13. Claims 32-38 are rejected under 35 U.S.C. 102(b) as being unpatentable by US Patent 3291347 by Blades

Blades teaching a method of mixing chemicals comprising the steps of flowing a first and second chemical into first and second tubes with known volumes to generate a measured amount of first and second chemicals (Figure 6). Blades discloses flushing the first measured amount with the second chemical and the second measured amount with the first chemical into an exhaust unit with a single reservoir (Figure 6).

Blades discloses a process within a single valve and fails to teach of two separate valve systems, 6-port and 3 port valves, however, the transposition of process steps or the splitting of one step into two, where the processes are substantially

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identical or equivalent in terms of function, manner and result, was held to be not patentably distinguish the processes. *Ex parte Rubin*, 128 USPQ 440 (Bd. Pat. App. 1959). In addition, Blades discloses mixing fluids using 6 port valves and 3 port valves, therefore separating the process of Blades into two steps, using any combination of 6-port and 3 port valves, would have been obvious to one of ordinary skill in the art because Blades teaches using 6-port valves and 3 port valves to mix fluids and therefore using any combination of 6-port valves and 3 port valves would reasonably be expected to effectively mix two chemicals together.

Allowable Subject Matter

14. Claims 8-13, 18, and 39-42 allowed.

The following is a statement of reasons for the indication of allowable subject matter:

15. Claim 8: None of the prior art cited or reviewed by the examiner discloses flowing DI water into a first and second conduit, wherein the DI water in the first conduit pushes the measured amount of chemical into a third conduit and thereafter mixing the contents of the second and third conduits and dispensing the flow onto a spinning wafer.

16. Claim 11: None of the prior art cited or reviewed by the examiner discloses flowing an inert gas through the valve systems to push the measured amount of first chemical and DI water into a chamber where the two measured amounts are mixed.

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17. Claims 39-42: None of the prior art cited or reviewed by the examiner teaches or fairly suggests mixing chemicals by flowing a first chemical into a valve system with a tube of known volume to generate a measured amount and flowing a second chemical through a control valve and then splitting the second chemical, where one split enters the valve system to push the measured amount first chemical through a control valve and the second split enters a different control valve and subsequently mixing together the two splits after the respective control valves.

Conclusion

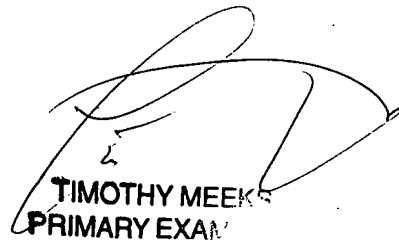
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Turocy
AU 1762



TIMOTHY MEEKS
PRIMARY EXAMINER